| Domain Establishment in Periodically Poled Lithium Niobate | X23A3 |
|---|---|

B. Steiner and G. Fogarty (NIST), and W. Burns (NRL)

High resolution diffraction images of periodically poled lithium niobate display strong influence by microstructural features on the domain configuration. The precise location of individual interdomain boundaries is affected by a prominent network of thin irregularities with a characteristic length of a few micrometers. These features are not crystallographically oriented, nor is their visibility associated with particular diffraction directions. Thus they appear to be mixed dislocations. Moreover, groups of individual domains also are affected by another, more incidental set of cyrstallographic anomalies, boundaries separating subgrains with characteristic dimensions of a few millimeters. The relative orientation of the lattice in adjacent subgrains differs over a range from less than an arc second to several arc seconds. Together, these two sets of crystallographic irregularities govern the configuration of the final poled structure.

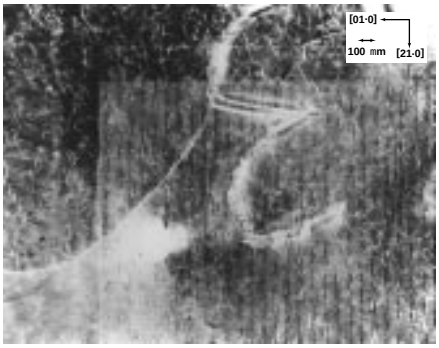


Figure 1. Symmetric 8 keV (1-210) image of poled lithium niobate crystal in Laue geometry. The diffraction vector lies in the horizontal direction, perpendicular to the inversion domain structure. The regularity in non-inverted domains, which appear generally darker in this image, is substantially greater than that in the inverted domains, which appear generally lighter, displaying reduced transmission and thus a lower degree of uniformity. The width of individual domains varies widely, reflecting dislocations.


Figure 2. Symmetric 8 keV (0 0 0 12) diffraction image of the poled surface in Bragg geometry. The plane of diffraction is vertical in this image, displaying misorientation around a horizontal axis. The low angle subgrain boundary that intrudes into the inversion domain structure from the left clearly interrupts the inversion process.